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ELA 342 Final Project

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Our syllabus says that "Environmental Liberal Arts applies the liberal arts to the study of the environment. "Liberal arts" actually began as, and literally means, the curriculum for free individuals. ELA focuses that curriculum on the environment. The liberal arts are a broad set of academic disciplines that foster problem solving and critical thinking skills, emphasizing reading, writing, and analysis." Our lecture taught us that ELA literally means a study of the environment by (free persons) citizens who take an active part in civic life and its goal is to promote a virtuous, knowledgeable and articulate citizenry. It encompasses the study of Natural Sciences: Biology, Geology, Chemistry, Physics, Ecology; The Social Sciences: Economics, Political Science, Anthropology, Psychology, Demography, Geography, Sociology; and the Humanities: Arts, Music, History, Literature, Philosophy, and Religion.

"The term sustainability has a multidisciplinary use and meaning. In dictionaries, sustainability is typically described by many sources as a capability of a system to endure and maintain itself...With human decision-making involved, sustainability attains a significant ethical aspect and transforms social paradigm on success, growth, profit, standards of living. This reevaluation requires broader and more synergistic overview of many components of anthropological ecosystems, including technology" (Fedkin). Our class lecture taught us that "What is or is not sustainable depends on assumptions about human behavior, resources and technology...we have to make assumptions about human behavior. What motivates people? How long will they live? How many children will they have?"

When I pull all of this together to determine how ELA applies to me, it means to use all of the areas of study in my liberal arts education, to make decisions on where I should use my voice to make sure that we as a society make appropriate decisions on the use of our resources. And that these decisions will ensure a comfortable life for people on this planet, forever. And using my voice means to get actively involved as a "free citizen taking an active part in civic life".

We were asked to write about a particular aspect of our life, or our community and environment, and how we could make it sustainable. Something that this course has taught me is that in order to make a decision about an issue that affects our environment it is important to consult a variety of sources, and points of view on the subject. I have changed my opinions on

timber logging so many times this semester. Each time I would read a new fact or point of view, I would jump sides. For the subject of this paper, I tried to think of a subject that I also change my mind on, a lot. Or blindly follow the current school of thought on, like a sheep. I knew immediately what subject I wanted to study and finally make my own informed decision on. So that I can inform others as a "knowledgeable and articulate citizen". I have decided to write about shopping bags. I wish to be an authority on whether paper, plastic, or reusable bags, are the best for our future. Especially now that Maine has instituted a Statewide ban on single-use plastic shopping bags. The ban was scheduled to go into effect on April 22, 2020, but has been delayed until January 15, 2021 due to the COVID-19 virus.

The Maine ban: "Applies to: All grocery stores, retail stores, restaurants, and any seasonal or temporary stores or markets. No retail establishment may distribute a single-use plastic shopping bag.

Retail Establishments May:

- provide a recyclable paper bag or reusable plastic bag for a minimum of five cents. BUT large paper bags must contain a minimum of 20% post-consumer recycled content.
- continue to provide plastic produce bags. Plastic bags may also still be used to wrap newspapers, dry cleaning, or tires. BUT stores that provide exempted single-use plastic bags must offer recycling stations within 20 feet of the store's entrance and must make sure that those products are in fact recycled.
- still sell plastic trash bags for people to use at home."(NRCM).

I have always just used whichever type of bag the rest of the population is currently promoting. I have depended on others to do the research and tell me what is right. I really hated when all of the grocery stores forced paper bags on us, a while back. They had some plastic ones hidden under the counter for people who requested them, but the use of them came with a dose of public humiliation. Plastic meant you hate children and dolphins. Or something like that. I'm not really sure. I could just feel that it would not be a good idea to ask for one. Now plastic bags are front and center, but the use of reusable bags is strongly promoted. My research has shown me that the UK has many studies on the subject. I feel a little embarrassed that the UK seems to care more for the planet than we do.

I decided the best way to make my own decision would be to find out how different types of bags are made, and what happens to them after we are done with them. And what could be done with them so that they do not end up filling up landfills. I would conduct "A Life Cycle Analysis" of shopping bags. (Cho).

I have heard that **paper bags** are processed with bleach and other chemicals that are bad for the environment. And that the chemical waste has to be disposed of somewhere and ends up polluting our water. **This is what I discovered:**

"Manufacturing a paper bag requires about four times as much water as a plastic bag. Additionally, the fertilizers and other chemicals used in tree farming and paper manufacturing contribute to acid rain and eutrophication of waterways at higher rates...they (the bags) usually aren't made from recycled material, because new paper has longer, stronger fibers. " (Thonpson).

"...bark is stripped off and the wood is chipped into one-inch cubes that are subjected to high heat and pressure. They are then mixed with limestone and sulfurous acid until the combination becomes pulp. The pulp is washed with fresh water and bleach then pressed into paper, which is cut, printed, packaged and shipped. As a result of the heavy use of toxic chemicals in the process, paper is responsible for 70 times more air pollution and 50 times more water pollution than plastic bag production"(Cho)."

"...takes more than four times as much energy to manufacture a paper bag as it does to manufacture a plastic bag" (Eddington).

"Wood chips (virgin fiber) are cooked using a chemical process in essentially a pressure cooker known as a digester. The wood fiber is separated into cellulose fibers, lignin (the wood glue that holds the tree together) and other substances such as sugars...The pulp is then washed to clean it and separate it further from the other tree components. After the pulp is washed, it is screened for further cleaning. For mills using recycled materials, pulp is made by mixing the recovered fiber with water in what resembles a large blender called a repulper. In the repulper, the pulp is separated to create individual fibers in a slurry. From there, the pulp is washed and screened to further separate the fiber from other debris like dirt.The pulp, which maintains its natural brown color, then needs to be formed into a sheet on the paper machine."(AFPA).

The information that I found from both "green" groups and the American Forest and Paper Association, was the same. The process to produce a paper bag does require a lot of water and some chemicals.

When studying the production of single-use plastic bags I discovered:

"The standard grocery store plastic bag is made from high-density polyethylene (HDPE). Studies agree that plastic bags are by far the least costly (i.e., carry the smallest ecological footprint) to produce. Still, there is no way around the fact that plastic is derived from petroleum.

Petroleum is a finite resource, and as it becomes increasingly limited, obtaining it becomes increasingly damaging to the environment" (Thompson).

"The bags "start as crude oil, natural gas or other petrochemical derivatives, which are transformed into chains of hydrogen and carbon molecules known as polymers or polymer resin" (Kushner).

"The most commonly found thin plastic shopping bags given out at cash registers are usually made of high-density polyethylene (HDPE), but some are made of low-density polyethylene plastic (LDPE).The energy embodied in plastic bags comes initially from the mining of the raw materials needed to make them—natural gas and petroleum—whose extraction requires a lot of energy. The raw materials must then be refined, which requires yet more energy. Once at a processing facility, the raw materials are treated and undergo polymerization to create the building blocks of plastic. These tiny granules of polyethylene resin can be mixed with recycled polyethylene chips. They are then transported by truck, train or ship to facilities where, under high heat, an extruder shapes the plastic into a thin film. The film is flattened, then cut into pieces. Next, it is sent to manufacturers to be made into bags" (Cho).

"... a research paper produced by the Northern Ireland Assembly said it "takes more than four times as much energy to manufacture a paper bag as it does to manufacture a plastic bag."Unlike plastic bags (which the report says are produced from the waste products of oil refining) paper requires forests to be cut down to produce the bags. The manufacturing process, according to the research, also produces a higher concentration of toxic chemicals compared with making single-use plastic bags" (Eddington).

"The source substances of polyethylene vary, but are almost always some form of fossil fuel. Both petroleum and natural gas are common sources and vital ingredients in almost all plastic bags available today. Properly refined, they yield ethylene, which is in turn made into polyethylene. This process is used mostly with natural gas, which yields a very flexible polyethylene substance that can be formed into nearly any shape and manufactured in any color"(Lacoma).

The study of reusable cloth bags revealed:

"Cloth bags are typically made from cotton, a particularly pesticide-intensive and water-guzzling crop" (Thompson).

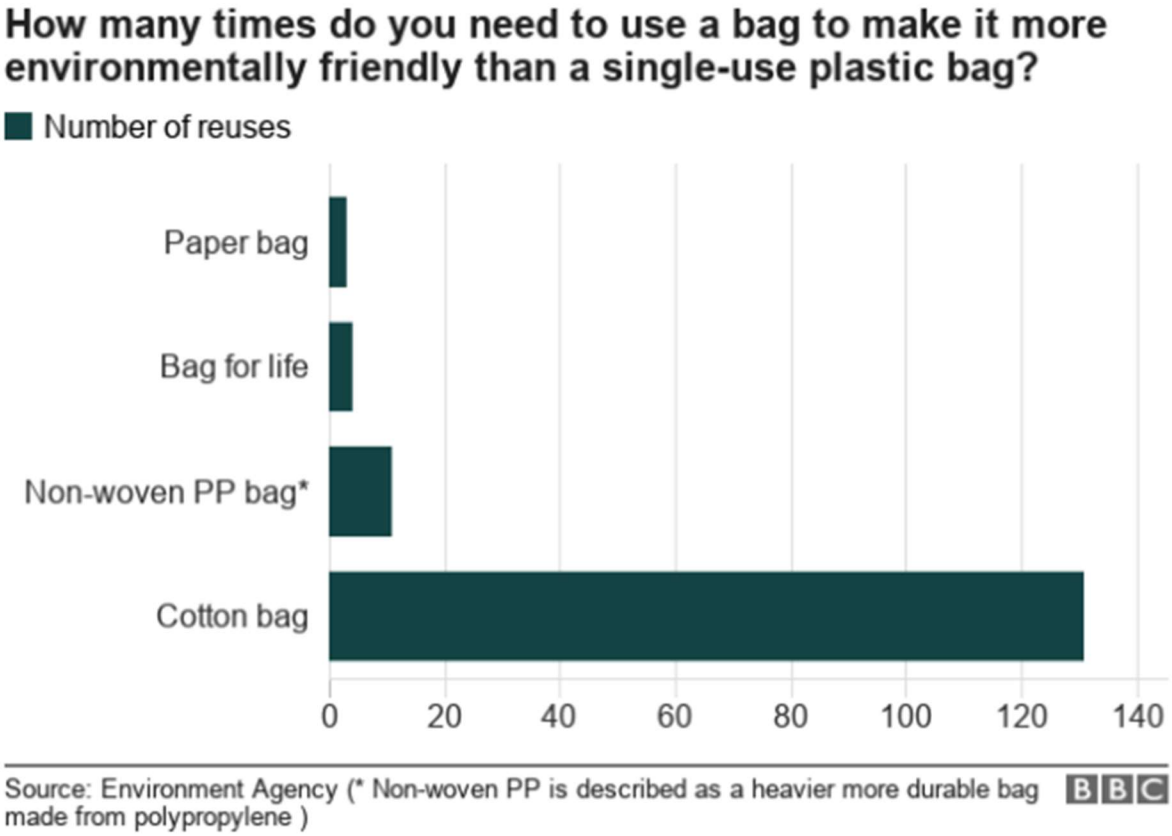
"Cotton first needs to be harvested, then cotton bolls go through the ginning process, which separates the cotton from stems and leaves. Only 33 percent of the harvested cotton is usable.

The cotton is then baled and shipped to cotton mills to be fluffed up, cleaned, flattened and spun. The cotton threads are woven into fabric, which then undergoes a chemical washing process and bleaching, after which it can also be dyed and printed. Spinning, weaving and other manufacturing processes are energy intensive. Washing, bleaching, dyeing, printing and other processes use large amounts of water and electricity"(Cho).

"A 2014 study done for the Progressive Bag Alliance, , which did not consider litter, was peer-reviewed by Michael Overcash, then a professor of chemical engineering at North Carolina State University. Because the carrying capacity of a plastic and a paper bag are not the same, the study used the carrying capacity of 1,000 paper bags as its baseline and compared their impacts to the impacts of 1,500 plastic bags. The plastic bags used 14.9kg of fossil fuels for manufacturing compared to 23.2kg for paper bags. Plastic bags produced 7kg of municipal solid waste compared to 33.9kg for paper, and greenhouse gas emissions were equivalent to 0.04 tons of CO2 compared to paper's 0.08 tons. Plastic bags used 58 gallons of fresh water, while paper used 1,004 gallons. Energy use totaled 763 megajoules for plastic, and 2,622 megajoules for paper.

Sulfur dioxide, a type of sulfur oxide, and nitrogen oxide emitted from coal-fired power plants that produce the energy for processing bags contribute to acid rain. The plastic bag produced 50.5 grams of sulfur oxides compared to 579 grams for the paper bag; and 45.4 grams of nitrogen oxides, compared to 264 grams for paper.

A 2011 U.K. study compared bags made of HDPE, LDPE, non-woven polypropylene, a biopolymer made from a starch polyester, paper and cotton. It assessed the impacts in nine categories: global warming potential, depletion of resources such as fossil fuels, acidification, eutrophication, human toxicity, fresh water toxicity, marine toxicity, terrestrial toxicity and smog creation. It found that HDPE bags had the lowest environmental impacts of the lightweight bags in eight of the nine categories because it was the lightest bag of the group" (Cho).



In order to be more environmentally friendly than a single use plastic bag, a paper bag needs to be used 3 times, and a cotton bag would need to be used 131 times.

Litter, or what we should do with bags when we are finished using them is a huge factor in deciding which bag to choose. Plastic bags filling up landfills, or being carelessly tossed so that they become a hazard for land and sea creatures, is a big problem. Maine has thought about this issue as it applies to produce bags, in our recently passed ban. All facilities "must offer recycling stations within 20 feet of the store's entrance and must make sure that those products are in fact recycled." I recycle the single use plastic shopping bags that I bring home from shopping. I donate quite a few to our local high school. The ceramics class needs them to store wet clay in. I also use them to pack lunches, pick vegetables from the garden to give to friends and family, and I use them to line my household trash cans.

The ban that Maine has designed makes sense to me, with some alterations. We should keep single-use bags. Bans of single use bags only cause sales of other plastic bags to go up. "...recent study from a researcher at the University of Sydney found that California's bag ban led to a moderate increase in paper bag usage and pushed some customers to buy thicker plastic

bags. The study suggests these thicker bags were purchased to replace the secondary use of free, single-use plastic bags as trash can liners or to pick up pet waste. As a comparison of weight, the study reported that 28.5% of the plastic reduced through a bag ban was offset by shifting consumption to other bags" (Hite).

Let us choose a single -use plastic bag, but we'll have to pay five cents for it, so we'll appreciate it more. We will be less liable to throw it away when we get home. We will be more likely to recycle it. But it needs to be the single use type of bag that we currently get at the store. Not the more heavy duty plastic reusable type. Or the reusable cotton type. Reusable types are a source of bacteria and disease. Which is why our current ban has been put on hold. "...another critical factor to consider is that cotton and other reusable shopping bags can carry bacteria and transfer it from home to grocery carts and checkouts and back again. One study of reusable bags discovered that they were rarely washed and as a result, bacteria were found in almost all the bags studied, with 12 percent containing E. coli. While most reusable bags are made of polypropylene, upon which COVID-19 has been shown to survive three days, so far there are no scientific findings about how long the coronavirus can survive on clothing or textiles. However, in a 2005 study of the SARS virus, another coronavirus, it survived on cotton for five minutes to one hour depending on the amount of exposure" (Cho).

There will always be disease and illness, even when our current pandemic has wound down. So reusable bags are not a good option. Paper bags are not a great option because they are heavier and require more fuel to transport, take up more space in landfills, and are not as effective or strong if made from recycled materials. Single-use plastic bags are the way to go. They provide the least impact on the environment. We should have to pay a small price for them so that we will not consider them garbage, and we will be encouraged to use them again. When they do go in the trash, we should use some form of new technology to recycle them. I like the idea of turning them into energy. "In France, they actually burn 30 percent of their bags for energy. Basically, you recapture the value of the bags by turning it into electricity" (Kushner). "Here's the case for burning. Plastic is made from oil and gas, and it creates a lot of heat when it's burned. So at first sight it makes sense to harness that by burning it in an incinerator to make electricity. It's even more efficient if the incinerator can capture the waste heat from the process and use it to warm offices and homes. Burning plastic this way currently substitutes in some places for burning dirty fossil fuels like oil or coal" (Harriban). Some sources say that this process would harm air quality. I remember a commercial for Welch's jelly, when I was a child.

https://www.youtube.com/watch?v=0RTg6KBqRVg I think a similar process could be designed for the incineration of shopping bag waste. And other types of waste as well. A chimney that filters and recycles smoke and ash back into the furnace.

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